

# Test of $\Delta I = 2$ Staggering in the superdeformed bands of $^{194}\text{Hg}$

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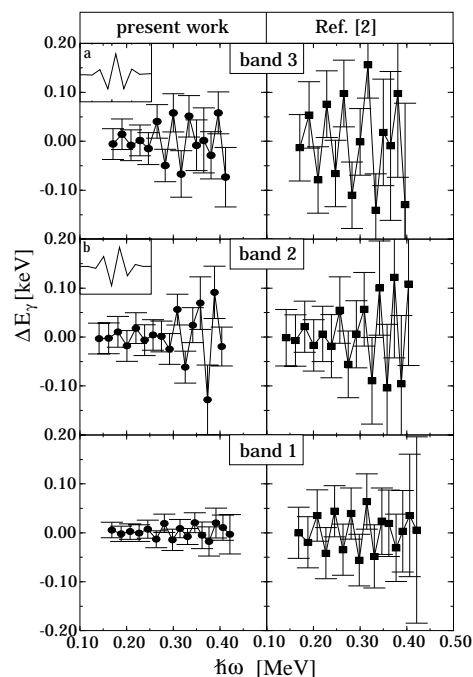
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Recently a regular staggering pattern of the transition energies was observed in the yrast superdeformed band in  $^{149}\text{Gd}$  [1]. Evidence for similar effects has also been reported for  $^{194}\text{Hg}$  [2]. The theoretical investigation of these effects has so far not been conclusive. It remains unclear whether to associate the observed staggering with a  $Y_{44}$  deformation of the superdeformed shape or with numerous band-crossings, since a single band-crossing cannot explain the extension of a staggering over a larger frequency range.

Since the observed energy shifts are only of the order of 100 eV or less, experimental confirmation of the reported effects is extremely important. Here we report on results from a new experiment on the known SD bands of  $^{194}\text{Hg}$ , looking for the previously reported [2] staggering in those bands.

Superdeformed states in  $^{194}\text{Hg}$  were populated in the reaction  $^{150}\text{Nd}(^{48}\text{Ca}, 4n)$  using a 201 MeV  $^{48}\text{Ca}$  beam. The emitted  $\gamma$ -rays were detected by the GAMMASPHERE array, which at the time of the experiment consisted of 70 Compton-suppressed Ge detectors. A total of  $1.4 \times 10^9$  events with fold four and higher were taken in this thin-target experiment. The transition energies in the three known SD bands of  $^{194}\text{Hg}$  have been determined with an accuracy of around 30 eV. The resulting staggering values  $\Delta E_\gamma$ , defined as the fourth derivative of the  $\gamma$ -ray energies, are presented in the figure. No statistically significant staggering was found in band 1. However, a significant staggering has been observed for band 2 in the frequency range above  $\hbar\omega = 0.3\text{ MeV}$  that includes one phase inversion. A short regular staggering with an amplitude of

50 eV has been observed in band 3 in the frequency range  $0.25\text{ MeV} < \hbar\omega < 0.375\text{ MeV}$ . The observed staggering patterns show similarities with patterns that can be induced by the crossing of weakly interacting bands. However, such a scenario cannot account in a simple manner for the observed staggering. Detailed information can be found in Ref. [3].



## References

- [1] S. Flibotte *et al.*, Phys. Rev. Lett. **71**, 4299 (1993)
- [2] B. Cederwall *et al.*, Phys. Rev. Lett. **72**, 3150 (1994)
- [3] R. Krücken *et al.*, Phys. Rev. C **54**, R2109 (1996)